ANDRÉ-MARIE AMPÈRE, 1775–1836 (Plate II)

André-Marie Ampère is the principal actor in the early development of electrodynamics, a word which he coined himself. He attained the highest honours which science had to offer, was a member of the chief scientific societies all over the world, and became universally acclaimed by his contemporaries. Yet in spite of this success, in his private life he presents a truly tragic figure.

Towards the end of his life he confessed that, of the whole, only two years had brought him any real happiness.

PLATE II. From a portrait kindly provided by Monsieur le Maire, Poleymieux au Mont.d'Or.

He was born in Lyon on 20 June 1775. His father was a retired merchant living at Polémieux-lez-mont-d'Or where André-Marie spent his infancy. There was no school in the village and Ampère was entirely self-taught. In early life he liked Buffon's *Histoire Naturelle* to be read to him. His father started to teach him Latin but, seeing the boy had an aptitude for mathematics, he postponed the study of Latin and left his son to follow his own desires, making himself responsible for providing him with books. The story is told of how, on one occasion, Ampère, at the age of 11, was taken by his father to the library of the Collège de Lyon, where he surprised the Abbé Daburon, the librarian, by asking for books by Euler and Bernoulli. On being told that they were among the most difficult ever written, he replied that nevertheless he thought he would be able to study them. On finding that those of Bernoulli were in Latin he quickly mastered sufficient of that language to be able to read them. At 18 he had started the *Mécanique Analytique* of Lagrange and made nearly all the calculations in it again, for himself. The twenty volumes of the encyclopedia of Diderot and d'Alembert he knew from A to Z. Fifteen years later he could recite whole passages from it by heart.

Then the storm broke. His father had become justice of the peace at Lyon and president of the Tribunal Correctional. However, he took part in the revolt of the city against the Convention. When the city had been retaken, he was arrested and guillotined. The evening before his execution he wrote to his wife regretting that he was unable to leave her even comfortably off. His greatest expense, he said, had been the purchase of books and geometrical instruments for their son, which he thought had been a wise economy, since the boy had had no other master but himself.

The effect of this calamity on the young André-Marie was overwhelming. He retired into himself and stared vacantly at the sky or made little heaps in the sand in front of him. He became a near idiot, and the effect lasted, in this intense phase, for a whole year. Beyond doubt his whole life was affected by it. At the end of this year he began to be revived by contact with J. J. Rousseau's *Lettres sur la botanique*. There then followed a phase of poetry in which he wrote large quantities of curious verse. It was in the fields, on a botanical excursion, that he met the lady whom he married on

2 August 1799. She was Julie Carron, not rich but deeply religious, an attitude she succeeded in imparting to her husband. Intense religious feeling, punctuated by periods of tormenting doubt, marked the whole of Ampère's latcr life. He himself recorded that there were three events which altered the course of his life. They were: his first communion, his reading of Thomas's *Eloge* on Descartes, and the Fall of the Bastille.

At 24 he had two happy years with his wife before him. A son, Jean-Jaques, was born to them on 12 August 1800. The son later became well known on his own account, as well as adding to his father's worries at other times; he wrote on poetry, on medieval French literature and on the foundations of the French language, ultimately becoming Professor at the Collège de France. Ampère lived with his family at Lyon and sought a post by which he could augment his meagre means. He could not obtain one in Lyon but was appointed to the Chair of Physics and Chemistry at the École Centrale of the Department of Ain, in December 1801, and this entailed his transference to Bourg. His wife was ill and unable to accompany him. She died in 1803. Ampère was profoundly affected by his wife's death, which led to a further crisis of religious fervour.

While at Bourg he wrote his first mathematical paper on the theory of probability, and this was favourably received by Lalande and Deslambre. Ampère was, in consequence, offered the post of Professor at the Lycée de Lyon, a post which it had been his ambition to achieve.

He married for a second time, largely on the advice of friends, but it was not a happy marriage. His second wife did not wish for children at any price, and, when she knew that she was to bear one, she made life intolerable for him. He learnt of the birth of his daughter, Albine, from the concierge. The marriage broke up on 11 January 1808. The second Mme Ampère lived until 1866 and died at Versailles.

Academic honours now showered upon him. In 1805 he was Répétiteur d'Analyse at the École Polytechnique. In 1806 he was elected member of the Bureau Consultative des Arts et Métiers. In 1808 he became Inspecteur Général of the University. In 1809 he was Honorary Professor at the École Polytechnique and Chevalier of the Légion d'Honneur. By 1814 he was a member of most of the

learned societies in Europe, including the Royal Society of London, in spite of the state of war between England and France. Arago recalls that for many weeks scientists from France and from abroad would crowd his humble laboratory in order to see demonstrated the orientation in the earth's magnetic field of a piece of platinum wire carrying an electric current.

In addition to his contributions to mathematics and physics, Ampère also cultivated an interest in ancient literature and history. He wrote extensively in philosophy, where he tried to reconcile religion with reason. He maintained the certainty of metaphysics. His last major work was on the classification of the sciences, in which he was able to employ his great breadth of knowledge.

Ampère possessed great candour combined with extreme sensitivity, simplicity and timidity. Throughout his whole life he felt himself drawn to his old home-town of Lyon where he had left his first and best friends. He was most inept in the management of his own affairs. He was never rich, yet he spent large sums on his scientific apparatus and gave away more than he could afford. Neither his son nor his daughter proved free of worry for him. Having just had a piece accepted by the Odéon his son abandoned it all to follow a Mme Recamier to Italy. His daughter married an officer, a gambler crippled with debt and an alcoholic. In addition Ampère tended to take upon his own shoulders the cares of the world, and they were many in the France of 1815. In that year he wrote to his friends in Lyon: "I am like grain between two millstones. Nothing could express the heart rendings I experience and I have no longer the strength to support life."

He suffered with severe myopia and read with difficulty. Once he met a young man similarly afflicted who lent him his spectacles, and for the first time he saw the marvels of light on the hills, a miracle which has to be experienced to be appreciated.

He never lost the habit of retiring within himself, especially during periods when he was troubled with religious doubts, and giving himself up to meditation. He came to be looked upon as a very bizarre character and accumulated round himself stories of the absent-minded professor. Once it starts there is no end to such a process. Most of these stories were doubtless purely apocryphal. They are like filings of soft iron which, though not magnets them-

selves, adhere to any magnet to which they are brought near. It was of Ampère that the story was first told of how, on the way to deliver a lecture, he noticed a peculiarly marked flint near the Pont des Arts, in Paris. He was examining this when it occurred to him that he would be late for his lecture. He took out his watch to see the time and then strode on, putting the stone in his pocket and throwing his watch in the Seine. In his lectures he was prone to mop his brow with the blackboard duster and to wipe the board with his handkerchief.

On another occasion, on his way to lecture, he was said to be turning over some problem in his mind and sought a surface on which he could put down some algebra which even he could not carry in his head. Seeing the black back of a cab drawn up by the kerb, he took out a piece of chalk from his pocket and soon had the surface covered with hieroglyphics. He was just on the point of reaching a solution when, to his consternation, the carriage drove away carrying his work with it.

Such is the mixture of triumph and sadness presented by the life of the great Ampère. He died in 1836. He had left for Marseilles on an inspection of the University, already suffering from an acute infection, and arrived there at the end of his strength. On 9 June, as he lay on his pillow, the Proviseur of the College commenced to read to him passages with hushed voice. Characteristically, Ampère stopped him and declared he knew the book by heart. He died on the following day.